Trellis Coding of Two Consecutive Full Response 4-ary CPFSK with Modulation Index 1/4

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Abstract

It is well known that trellis coded modulation schemes using multidimentional constellations for MPSK and QAM have a number of advantages, such as improved performance, over the more common two dimensional schemes [1,2]. Rimoldi [3,4] has recently shown that a continuous phase modulation (CPM) signal can be decomposed into a time invariant continuous phase encoder (CPE) and a time invariant memoryless modulator (MM), This decomposition of CPM makes it possible to combine the CPE with an outer encoder.

This paper extends the decomposition idea in [3,4] to decompose CPM over N symbol time intervals into a time invariant N-consecutive phase encoder (NCPE) and a memoryless modulator. This construction allows combining a high rate convolutional encoder with NCPE to obtain a super trellis encoder. To design the combined super trellis encoder with memoryless modulator, as a Multiple trellis coded CPM, a set partitioning method is presented which preserves the phase continuity.

As a special case, this paper considers trellis codes for two (N=2) consecutive 4-ary continuous phase frequency shift keying (CPFSK) signals. The convolutional codes are designed for 2 to 16 states by using the set partitioning method for two consecutive CPM signals, Coding gains of 5.2 to 7.5 dB over uncoded 4-ary CPFSK is achieved,

References:

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